

## Scaling Artwork, Continued

Use

To use a proportional scale for reduction, use this table:

Step	Action
1	Measure the dimensions of the allotted space.
2	Measure the dimensions of the original artwork.
3	Rotating the scale, align the dimension representing width of the original artwork across from the dimension representing the allotted width.
4	Without moving the scale, read the dimension located directly across from the dimension for height on the original artwork. This is the proportional height of the allotted dimension.
5	A small window toward the center of the scale will give you the ratios of the percentage of the original size and the number of times the artwork is reduced.

To use a proportional scale for enlargements, use this table:

Step	Action
1	Measure the dimensions of the allotted space.
2	Measure the dimensions of the original artwork.
3	Using the measurements on the scale inversely, rotate the scale to align the dimension representing the width of the original artwork with the dimension representing the width of the allotted space.
4	Without moving the scale, read the dimension located directly across from the dimension for height on the original artwork. This is the proportional height of the allotted dimension.
5	The small window toward the center of the scale will give you the percentage of enlargement of the original artwork but, will not give you the number of times enlarged.

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## Scaling Artwork, Continued

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### Uniformity

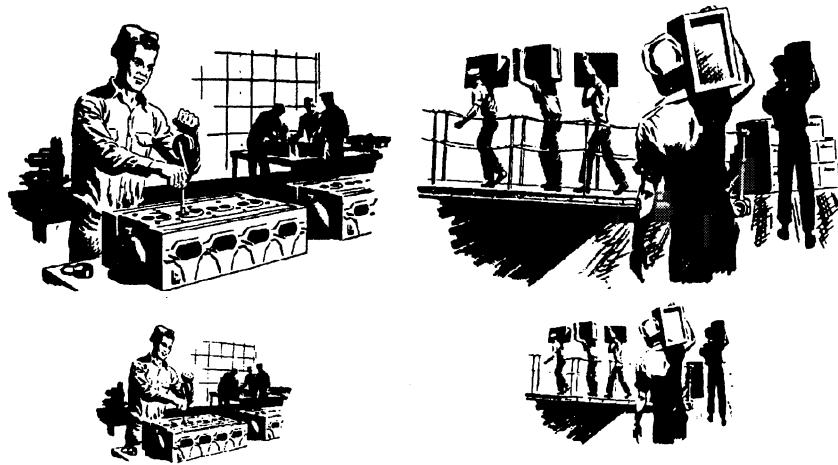
When you prepare a series of illustrations for a publication, draw them all to the same scale, if possible. This will save you time at the camera, in the darkroom, and in preparing the mechanical paste-up. This will also improve the overall appearance of the product. Carefully plan artwork that contain text to assure a uniform size of the text in the finished product.

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### Limitations

There are limitations on the amount of reduction or enlargement a piece of artwork can endure. Prepare your line copy for same size or smaller reproduction. In general, make your artwork a maximum of two times larger or a minimum of one and one-half times larger than the desired size, or at another scale in between the two, as long as it remains proportionally correct. This technique minimizes irregularities and makes the drawing appear more finished. Artwork drawn very large and extensively reduced will begin to fill in detail and appear dark and heavy. Artwork drawn small and enlarged will appear crude and rough because defects tend to magnify. Before beginning a drawing for reproduction, remember that both the lines and the spaces between the lines are reduced or enlarged.

Figure 1-30 shows the effects of enlargement and reduction on artwork.



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**Figure 1-30.**—Reduction and enlargement will lose detail and magnify defects in reproduced artwork.

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## Mechanical Preparation

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### Introduction

The printing process largely determines the quality of reproduction; however, the best machinery available cannot hide the flaws in a poorly constructed mechanical. It is through the mechanical that the DM exerts a direct influence on the resulting print, both in quality and cost.

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### Preparation

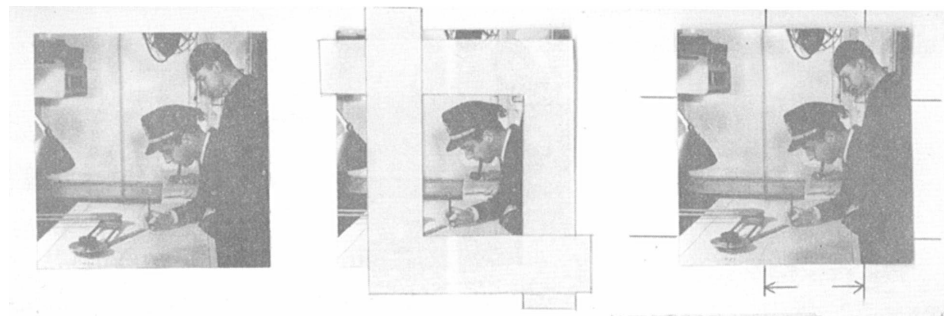
Before you begin creating artwork for reproduction, you must gather your materials and information. Determine the press operation involved and the materials to do the job. Settle on a format, finished stock, and type style. If the originator provides artwork, it may require cropping, retouching, eliminating background clutter, or halftone screening. If you must copyfit or scale artwork, do so before you commit yourself to paper.

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### Cropping

Sometimes you use only a specific portion of the original artwork in a finished product. Cropping is the procedure of defining the desired reproduction image area within a larger piece of work. A simple method of cropping uses two right angles cut from opaque paper or board. By maneuvering the two pieces of angled paper, you can frame the desired subject in many different ways. You indicate crop marks on a drawing or photograph by lightly marking the borders of the artwork or print, by marking an overlay attached to the artwork or print, or by cutting a window in an opaque masking paper, such as goldenrod, to expose the desired portion of the artwork or print. Use a grease pencil if you mark on the borders of original artwork so it can be easily removed. Do not mark more than one set of crop marks on the same artwork.

Figure 1-31 illustrates the use of cropping arms.



**Figure 1-31.**—Cropping arms.

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## Mechanical Preparation, Continued

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### Retouching

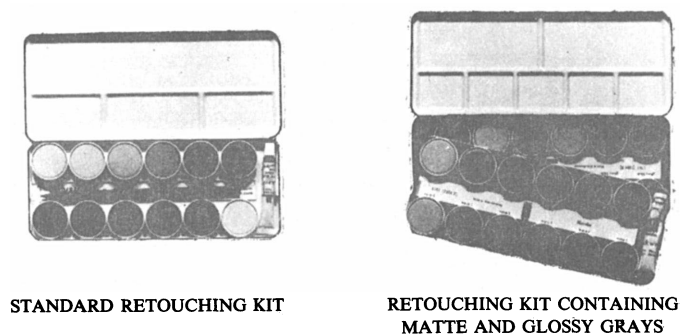
Photographs are rarely used for reproduction without some work being done to them to highlight important features or to suppress undesirable characteristics. You may eliminate minor flaws in a photograph by using a photo retouch pencil or opaque retouch greys applied by brush or airbrush. Handle a photograph carefully and avoid leaving fingerprints on the photo surface during preparation. Your natural oils will prevent the paint from adhering. The surface of a photograph has a slick resin coating which you must lightly abrade with Fuller's Earth, a fine, white powder, before you begin retouching. Paint the light values first, then the middle values. Paint the dark values last.

**RETOUCH PENCILS:** Retouch pencils are available in various shades of grey and color. Avoid digging into the surface of the photograph. Use a slow, fine, circular motion to match the values in the image and spray the finished print lightly with a fixative.

**RETOUCH GREYS (cake form):** Retouch greys are a series of opaque greys plus black and white in a premixed cake. Wherever you use white, use it pure or it will reproduce as a light grey. Spray the retouched print with a fixative.

**RETOUCH GREYS OR COLOR (liquid form):** Apply liquid form retouch greys or colors with an airbrush. Extremely detailed or extensive retouching is possible.

Figure 1-32 shows retouch greys in cake form.



**Figure 1-32.**—Retouch greys.

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## Mechanical Preparation, Continued

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### Silhouetting or vignetting

Silhouette an object if you need to reproduce a subject in outline form. This process partially obscures or completely eliminates background clutter. Vignetting is a process of softening a background with a burned-edge effect. You may use either a photograph or a halftone. If you must preserve the original print, cover it with a clear acetate overlay in tight registration.

To silhouette an object, follow this table:

Step	Action
1	Clean the surface of the photograph with Fuller's Earth.
2	Carefully outline the desired object with a 1/4-inch width margin of opaque white. Apply thin coats. Do not cake on the opaque white as it tends to chip and flake when dry.
3	Indicate to the printer the removal of all background material outside of the white border.

To brush or airbrush a silhouette, follow this table:

Step	Action
1	Clean the surface of the photograph with Fuller's Earth.
2	Apply a stencil or mask to protect the areas of the image you wish to retain.
3	Apply an even coat of pigment over the undesired area.
4	Allow to dry.
5	Remove the frisket or mask.
6	Use a small cotton wad to remove excess pigment seepage and to soften the edges of the outline to make it look more natural.

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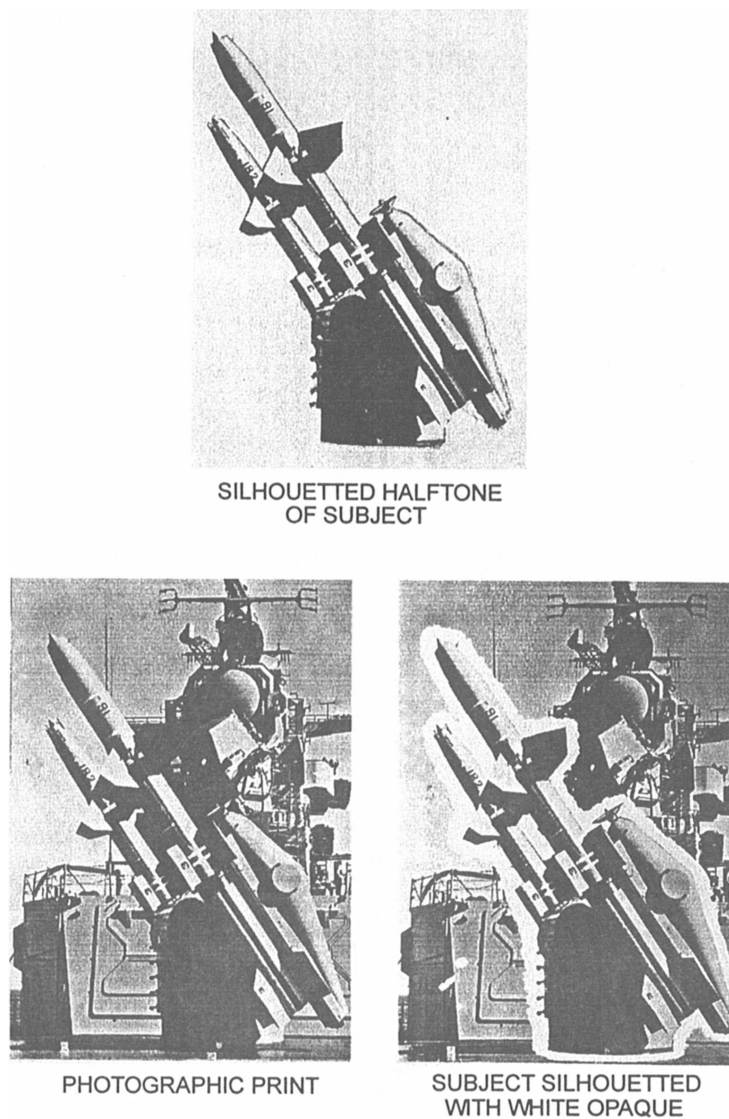
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## Mechanical Preparation, Continued

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### Silhouetting and vignetting (Continued)

Figure 1-33 illustrates the procedure for silhouetting.



**Figure 1-33.**—Silhouetting procedure.

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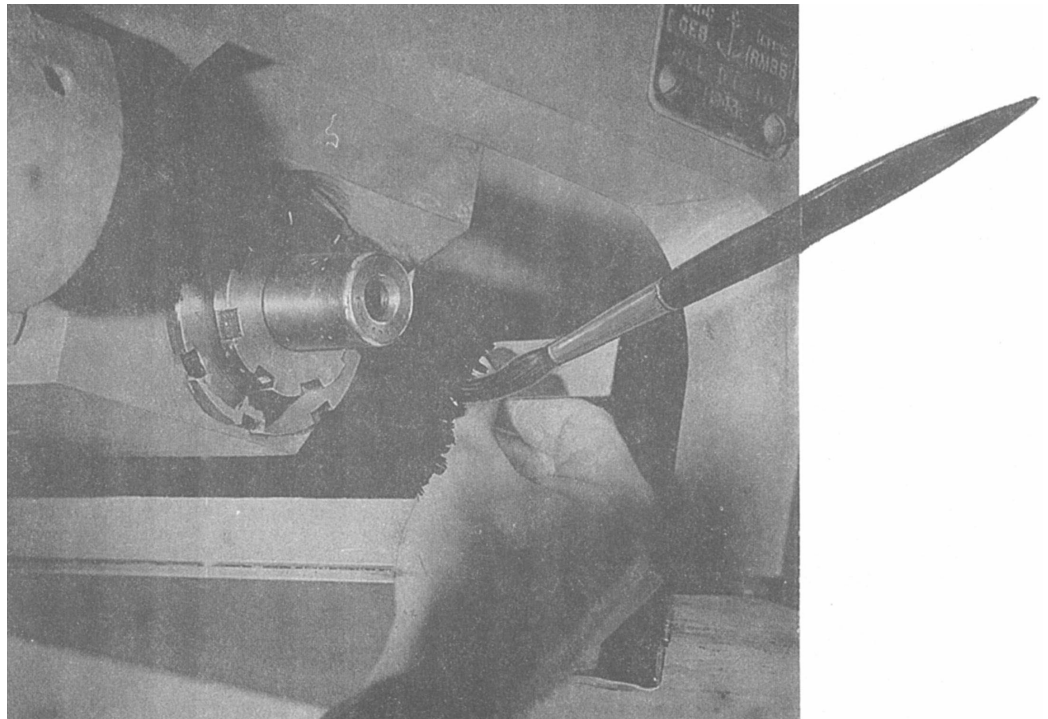
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## Mechanical Preparation, Continued

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### Silhouetting or vignetting (Continued)

Figure 1-34 shows the removal of background objects by eliminating the background with opaque pigment.



**Figure 1-34.**—Removing background objects.

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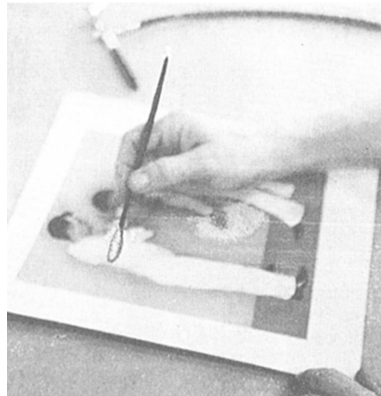
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## Mechanical Preparation, Continued

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### Silhouetting and vignetting (Continued)

Figure 1-35 shows the process of removing excess paint with a moist cotton swab and feathering hard edges left by the silhouetting process to create a more natural appearance.



**Figure 1-35.**—Removing excess paint with moist cotton.

To vignette an object, follow this table:

Step	Action
1	Prepare the surface of the photograph with Fuller's Earth.
2	Apply a frisket or mask to protect the areas of the image to remain unaffected.
3	Airbrush pigment onto the photograph beginning with the four corners using a light, airy, circular motion.
4	Continue to rotate the photograph, spraying the four corners one by one, until the pigment covers the amount of the photograph desired. Strive to keep the coverage even.
5	Allow to dry.
6	Remove the frisket or mask.
7	Clean the desired image area of seepage and soften the edges around the image to give a more natural effect.

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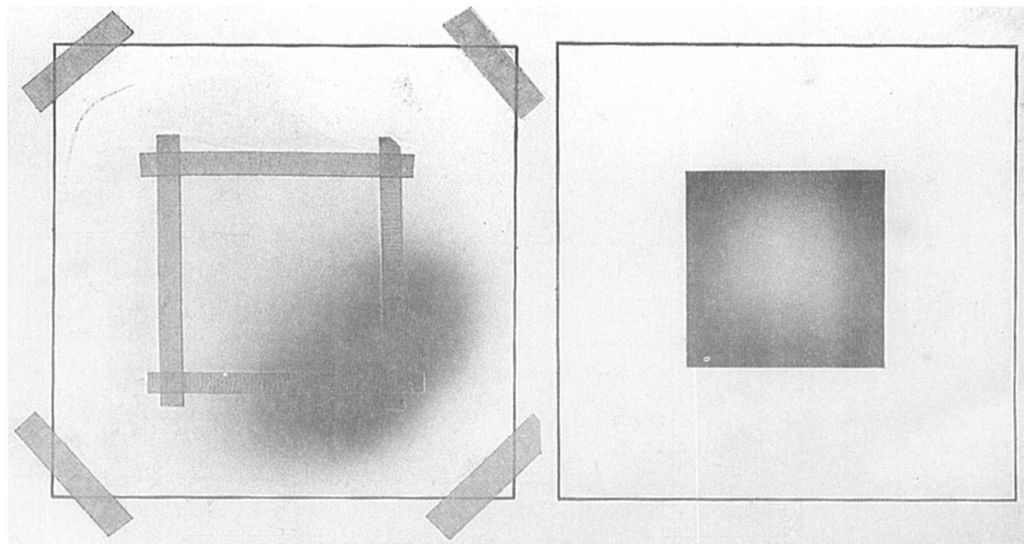


## Mechanical Preparation, Continued

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### Silhouetting and vignetting (Continued)

Figure 1-36 illustrates the vignetting process.



**Figure 1-36.**—The vignetting process.

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## Mechanical Preparation, Continued

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### Silhouetting and vignetting (Continued)

Figure 1-37 shows an subject with a vignetted background.



**Figure 1-37.**—Vignetted head-and-shoulders portrait.

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## Mechanical Preparation, Continued

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### Halftones

Some printing presses and machines are not capable of producing good quality continuous tone images. Continuous tone images, such as watercolors, drawings, oil paintings, photographs, and other works composed of a series of tones tend to blend together or lose detail. To separate these tones, the artwork must be shot through a screen that breaks the image up and records it as a series of dots. This process is known as halftone screening. Exposure, similar to that used in line photography, is determined by the intensity of the light reflected from the original copy, distance between the film and the screen, size and shape of the lens aperture, speed and contrast of the film emulsion, and the duration of the exposure.

**BLACK-AND-WHITE HALFTONE SCREENS:** Halftone screens used for black-and-white photography are generally rectangular and made of glass or acetate. Glass halftone screens are made of two sheets of optical quality glass, each etched with fine parallel lines filled with opaque pigment and sealed together with the lines crossing each other at right angles. Halftone screens are available in standard rulings from 50 to 400 lines per inch set at a 45-degree angle to the screen. The lines on the screen are the same width as the space between them. Therefore, a 50-line screen has 50 lines and 50 spaces to each inch. Screens are grey or magenta in color. The 45-degree angle makes the dot pattern less noticeable to the human eye. Position a glass halftone screen a short distance in front of the film plane. Position an acetate halftone screen in direct contact with the film.

**COLOR HALFTONE SCREENS:** Halftone screens used for color separation work are circular. You must set the angle of the screen and rotate it for each color shot. Halftone screens for color work are not in color. Color halftone screens are available in standard rulings.

**DIGITAL HALFTONE SCREENS:** A computer with a desktop scanner or video digitizer scans continuous tone artwork and photography transforming them into a digital format. The scanner must be a grey scale scanner. If you alter the image, do so before scanning. Limited image alteration is possible with the appropriate image-editing software. Scan the imagery at a resolution twice the final screen ruling. Save the image in a Tagged Image File Format (TIFF) or Raster Image File Format (RIFF). You can output these digital halftones to laser printers or high-resolution copier-printers.

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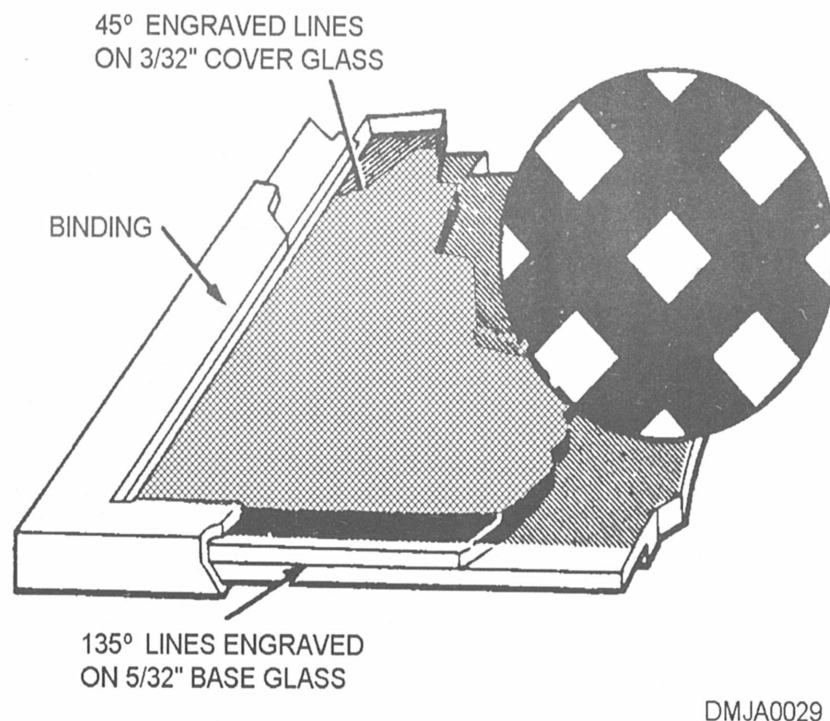
## Mechanical Preparation, Continued

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### Halftones (Continued)

On occasion, the individual requesting the job may not have the original continuous tone photograph but, a reproduced copy that has already been through the halftone screen. If the halftone screen used was coarse and open, you may be able to shoot it as a line shot. If not, you may have to rescreen the image. Rescreening a halftone image will create a wavelike or checkered pattern where the two dot patterns overlap. This is called moire. This pattern can be undesirable and distracting. You can reduce or eliminate this effect by turning the screen 15 degrees away from the halftone or using a screen 50 lines coarser or finer than the original screen.

Figure 1-38 shows a sectional view of a glass halftone screen.



**Figure 1-38.**—A sectional view of a glass halftone screen.

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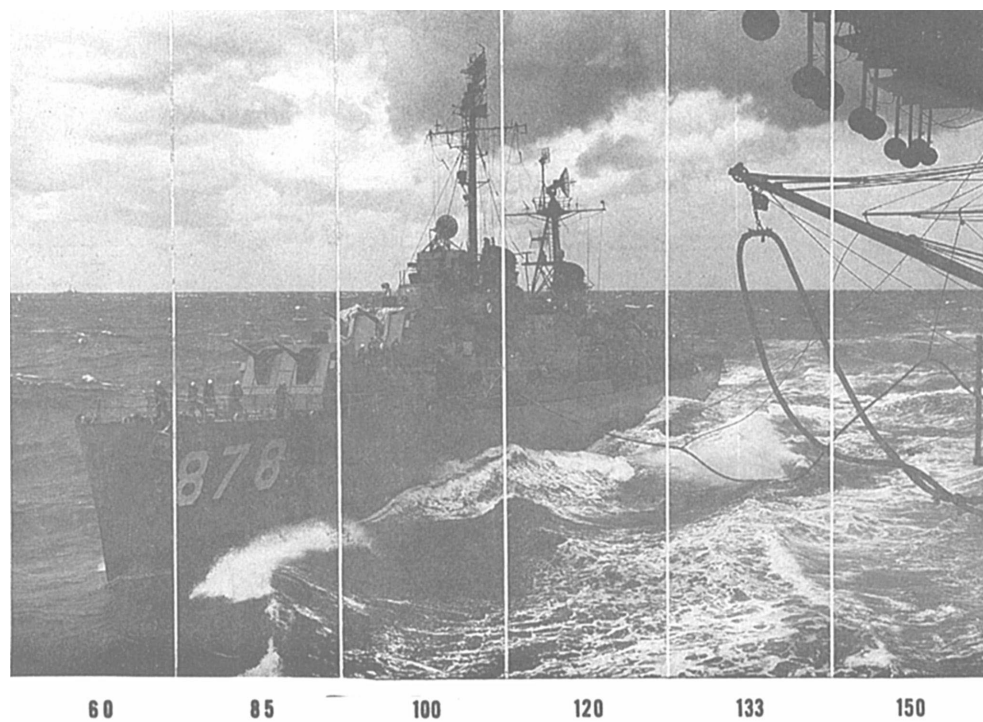
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## Mechanical Preparation, Continued

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### Halftones (Continued)

Figure 1-39 shows the effects of different screen patterns.



**Figure 1-39.**—The different screen rulings.

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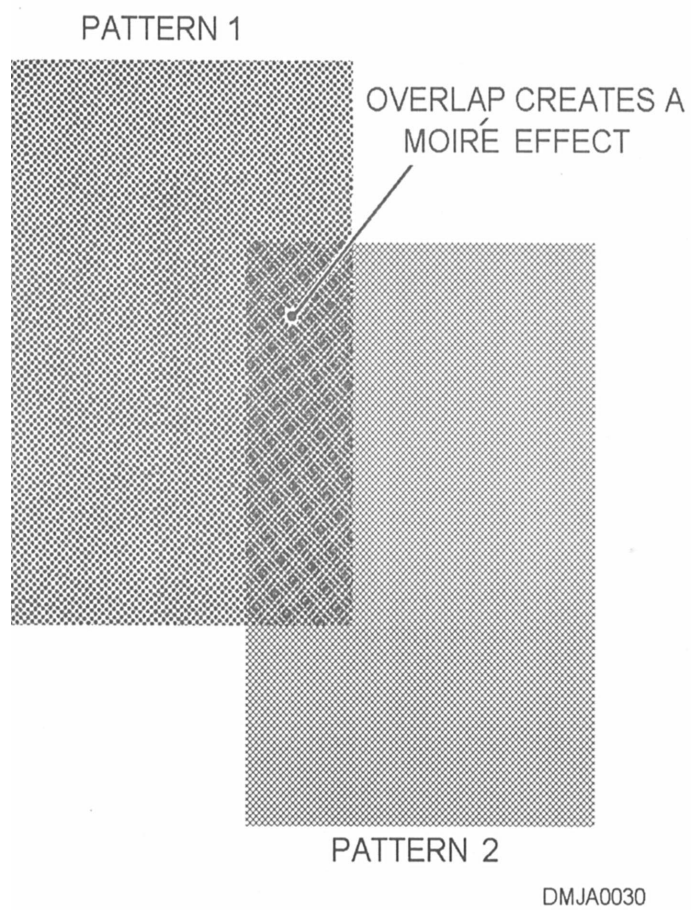
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## Mechanical Preparation, Continued

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### Halftones (Continued)

Figure 1-40 shows the moiré effect created by the overlap of differing screen patterns.



**Figure 1-40.**—The moiré effect.

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# Mechanical Preparation, Continued

## Putting it all together

The finished mechanical must withstand considerable handling as it moves from one phase of reproduction to another. Prepare your mechanical on illustration board and cover it with a protective covering of tissue paper or acetate. The larger the mechanical, the heavier the illustration board. If the mechanical has one overlay, tape the overlay to the top of the illustration board. If the mechanical has multiple overlays, register each overlay to the illustration board so that they may be removed and easily replaced by the camera person. Leave ample border all around the image on the mechanical to insert instructions for the keying of separate copy elements. Mark these instructions in nonreproducible blue on white areas and yellow on black areas, such as a black patch. Use initials or numbers to key halftone negatives for insertion. Above all else, keep the mechanical clean; the camera records every stray mark, including marks that are ghostly visible.

Figure 1-41 shows a mechanical with a halftone insertion indicated.



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Figure 1-41.—A layout containing masked-out areas for halftones.

# Electronic Prepress Preparation

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<b>Introduction</b>	Increasingly, more sophisticated digital presses are appearing in work spaces. These machines allow the DM or LI to electronically program (digitize) the job parameters into memory instead of using conventional mechanicals and press plates.
<b>Purpose</b>	Because prepress preparation is minimal, short-run or small jobs are more economical to run. Digitized printing allows flexibility during the revision process of a book and eliminates the need for a stockpile or large inventory at distribution points. Rapid turnaround time, now defined in hours, not days, increases the customer base and customer satisfaction. The term on-demand printing is often, but not solely, associated with digitized printing.
<b>Digital printing</b>	Digital printing is a relatively new concept in the printing industry. This type of printing uses plates, created by a spark discharge, to print. This eliminates liquids, such as ink and water used in traditional offset lithography. Digital printing is defined as any printing using a raster-based process to produce an image carrier or replicate directly to a substrate from digital document files. Color applications, currently limited, are increasing as the new technology develops. Eventually, digital approaches will apply to every facet of graphics communication whether you print 1,000, 100, or 1 duplicate. Make sure you read and understand the operating manuals that pertain to the equipment.

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## Color Separation

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<b>Introduction</b>	You may have an opportunity to create artwork intended for color printing using the traditional offset lithographic process. The three types of color separation processes are process color, spot color, and fake color. The format of the master artwork determines the type of separation process you use.
<b>Process color</b>	When you create the master artwork in a continuous tone medium, such as a watercolor or a photograph, the color separation process is left to the camera operator. This is process color. Very close reproductions result from using color in the artwork similar to the color available to press inks.
<b>How process color works</b>	The printer makes four separate negatives and four separate press plates for each piece of continuous tone color artwork. Since colors photograph as black or shades of grey, the printer uses regular black-and-white film. A grey scale, photographed along side the artwork will assist the photographer in comparing densities and contrast for each negative. The negatives must have the same contrast and density or the resultant print will be out of balance. Shooting through a halftone filter and a series of color filters separates the colors of the original copy and breaks the image into a dot pattern. The printer changes the angle of the halftone screen for each negative to cause the dot pattern to overlap or print side by side in the final print. A blue filter records yellow, a red filter records cyan (blue), a green filter records magenta (red), and no filter or a combination of the three filters records the black in the original. Conventionally develop the film. Hand correct any negative aberrations. Expose and develop the press plates. Pull a proof from the press plate in the appropriate color. This is known as a progressive proof. The colors of the original artwork reproduce when the plates are run on the press in the proper colors of ink. Overprinting produces the color sensations of secondary and tertiary colors. Overlapping three or more colors produce black.

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## Color Separation, Continued

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<b>Spot color</b>	Spot color is a process you use to indicate areas for color separation by placing an overlay over a simple black-and-white line illustration. Make precise instructions to the printer on this overlay. If the drawing is complicated or has detailed color areas, make the color separations yourself. Create an overlay for each primary color, register it to the master, and indicate the desired color of ink. This process produces flat color with no modeling or shading. You create modeling or single color variations by using a shading sheet in the artwork or requesting the camera person to use a benday sheet.
<b>Fake color</b>	Fake color involves printing from original line artwork or continuous tone photograph by indicating color or screen tints on a separate overlay. The outlines of the image define the various color areas to strip in color panels.
<b>Duotones</b>	Using only two plates to print a color image with a dark dominant ink and a lighter secondary ink, results in a print known as a duotone. Two negatives are shot at different angles from a single piece of artwork. One of these negatives is shot flatter than the other so that one plate will supply color while the other plate supplies detail. The detail is usually printed in the darker or dominant ink. You may use any combination of inks or black ink and a grey ink (called a true duotone). The two plates printed together produce a duotone print that appears to have more dimension than the original image.
<b>Bourges sheets</b>	In the creation of artwork for color reproduction, you want to most nearly approximate the finished product before you commit yourself to the expense of color printing. Bourges sheets are transparent color sheets available in various colors and densities. By building up, removing, or cutting out sections of the sheets, you create color copy in separate overlays. The combined overlays simulate the printed product.

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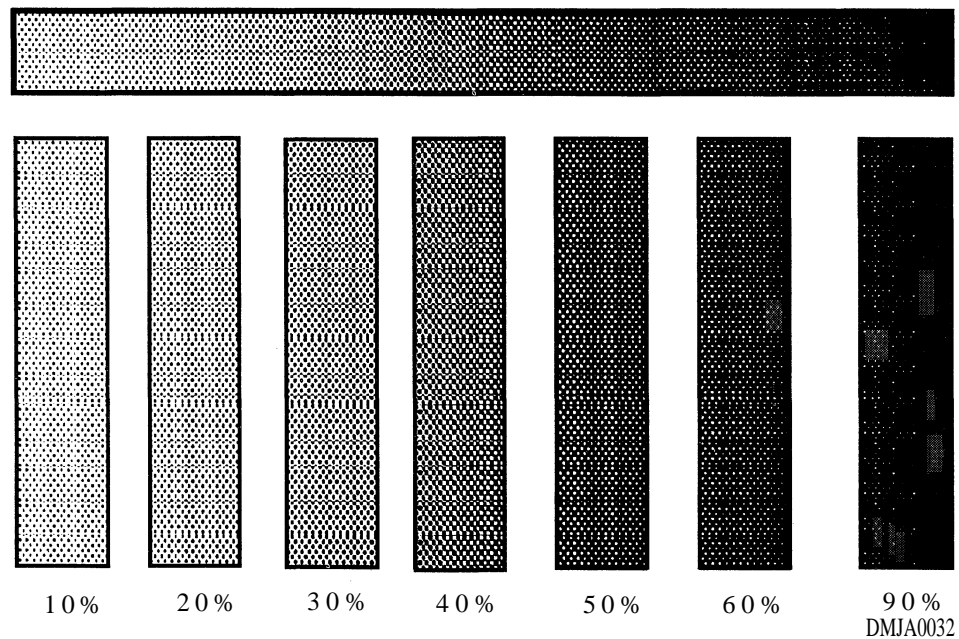
## Color Separation, Continued

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### Benday or shading sheets

The benday process involves photographing negatives through percentage screens to filter the intensity of the image. Shading sheets are similar to the benday process except, the artist uses a light-tack adhesive-backed pre-printed percentage screen in the creation of the master artwork. The percentage of the screen represents the solidity of the image. For example, a 20-percent screen is light, whereas an 80-percent screen is dark. Screens are available as dots, lines, and patterns.

Figure 1-42 show example of flat color (black) with various screens.



**Figure 1-42.—Varying percentages of flat color.**